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State Section Representatives to the Annual Meeting of the American Society of Psychosomatic Dentistry at Buffalo, N.Y., March 23 & 24, 1957

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SOME PSYCHIATRIC ASPECTS IN DENTISTRY*

HANS UNGER, M.D.**
Buffalo, New York

DENTISTRY began like surgery did, – as a skillful craft. Those who practiced it did not have to undergo academic training in basic sciences such as anatomy, physiology or chemistry. These branches of the healing art were then not recognized as high professions. With increased knowledge and understanding, this began to change. Leading men in these fields came more and more to the conviction that one can neither treat a fractured arm nor a tooth apart from the rest of the body, but that one always has to treat the whole person, the whole patient. By following these principles, dentistry has developed into the high profession which we, today, so rightly classify it.

But when we talk of "the whole person" we no longer refer merely to the human being as a biological unit. Medicine has become more and more aware of the fact that the body and the mind, which controls it, form an indivisible unit. To draw a line between these two, body and mind, is just as artificial as to draw such a line between a single organ, a tooth, and the rest of the individual. There is a constant mutual relationship between body and mind, each influencing the other. We speak of psychosomatic medicine in the broad meaning of the term if we want to emphasize this relationship. Dentistry, in order to keep up with the changing times, cannot disregard these newer approaches.

The fact that emotions may be expressed by somatic symptoms has been known for a long time, though poorly understood. The hysteric was usually lumped together with the malingerer. In hysteria proper, the symptoms are expressed by malfunction of organs which are ordinarily under the influence of our conscious will, such as in hysterical blindness or paralysis, where no organic findings seem to justify the patient's complaints. The role of the unconscious mind was not known, and so the patient was supposed merely to be lacking in will (meaning conscious will). Today, we know that in typical hysteria the symptom has a function, protecting the patient against a psychological catastrophy. Sudden removal of symptoms by hypnosis may have catastrophic consequences, driving the patient into insanity or suicide.

This more modern approach was greatly supported, or even initiated, by the observation that emotional influences by no means find their physical expression only by symptoms related to the voluntary nervous system, but that they also frequently find expression

*Read at the Annual Meeting of the American Society of Psychosomatic Dentistry, March 24, 1957

**Senior psychiatrist at Buffalo State Hospital, Buffalo, New York.

along the automatic, sympathetic and parasympathetic nervous pathways. A number of diseases, limited, at first, in number, were found to be intimately connected with emotional disturbances. Graves' disease was at first merely considered a disease of the thyroid gland. However, it has been recently recognized that the gland was only the immediate cause. The original cause has been found to be some emotional turmoil, from which the patient was suffering. Stomach ulcers, certain forms of colitis, asthma and circulatory diseases were soon added to the list of psychosomatic diseases. In all these diseases, we can demonstrate well defined X-ray findings and organic lesions, so that certainly one could not call this imagination or malingering. These diseases are as real as can be, and the influence of emotional factors on different organs of the body can no longer be questioned. It finally became more and more clear to us that, actually, in every disease there is at least a concomitant emotional factor to be found, which influences and complicates the course of the disease; it plays a great role in deciding the best course of treatment for a particular patient. For even if two people are suffering from identical diseases, the difference in their personalities may make a different therapeutic approach advisable in each case. Again, we like to emphasize that we are always faced with a psycho-biological problem in each case.

Under these circumstances, the study of some basic psychology has become more and more important for the medical and for the dental profession. The patient who comes to the dentist brings with him prejudices and attitudes, which he has carried over from former times, from former occasions. By this, we not only refer to his former experiences with dentists; by a rather complicated mental process, he identifies the new situation with an old familiar one, according to his own personality make-up. One person may see in the dentist a person of high authority, and automatically react to the doctor in a similar way in which he always meets authority, in which he once, let us say, met and struggled with his father. Another patient may revive in his unconscious mind scenes in which he was forced to submit helplessly to painful situations, and will meet the dentist with ill-concealed hostility. All this may have nothing to do with the dentist as he actually is, but as he appears in the inevitable distortion in which the patient sees him. Remember that you yourself seldom meet a person without having some feeling about him or her right from the first moment, a feeling which comes from somewhere in your past, long forgotten, a feeling which you may have to correct later, if you come to know the person better. The patient, however, is in a much worse situation. He comes to the dentist, entering a situation which he knows will be, even at best, a painful and disagreeable one. Most people will

come to the dentist, especially a new dentist, with exaggerated fears and anxiety, which might be quite out of proportion to the real situation. Let us not forget how often, unfortunately, the dentist is used as a threat of ill-advised mothers against the supposed evils of thumbsucking, etc. The dentist may appear as a punitive, mutilating person, associated with other threats used for the same habit, thumbsucking, for example, that the thumb may be cut off etc. Often candies are refused to a child with remarks about the bad effect they may have on teeth, and that painful dental work will result from indulging in these sweet pleasures. Suffering is expected, and you, the dentist, are the one to administer it.

Naturally, on the rational, intellectual level, you will be acknowledged as the man who helps the patient, whom the patient really needs. Nevertheless, irrational feelings are apt to develop. The dentist works in close physical contact with his patient, and with a very important sensitive and psychologic part of the body. This may lead to complications and anxieties of which we will speak later. The role of the dentist is a very different one from that of the psychiatrist in one important aspect. While the psychiatrist has to deal with the patient's mental mechanism with the aim of adjusting it, the dentist will have to take the psychic make-up of his patient for granted and will have to try, rather, to adjust himself to the patient's peculiarities in order to give him the best care, the best for this particular patient. Both psychiatrist and dentist, however, are in a similar position in another respect. They both have to deal with the aforementioned distortion of patients' views and attitudes, which are usually called transferences. It must be strongly pointed out that the doctors also have such a necessarily distorted view of the patient when they meet him for the first time. In rare cases, abnormal cases to be sure, this may become so strong as to interfere seriously with the successful practice of dentistry. Such cases have been reported. Recently, a dentist decided to give up his practice altogether until successful psychotherapy could reduce his distortions of the patient-doctor relationship, and he was able to resume his practice without the former spells of anxiety which seemed so unexplainable to him. A certain amount of distortion, which we call counter-transference, is inevitable in any therapeutic situation. This may be the time to point out to you one important fact - that it is merely a matter of degree which constitutes the difference between what is usually called mental health, and mental illness. The mental patient, whether a mild neurotic or even a severe psychotic, uses still the same mental mechanism we encounter in normal people, but in a degree proportional to the severity of his disturbance. These mechanisms and defenses have become inefficient, overdone, absurd. In

the most severe cases they are no longer checked and corrected by rational thinking. The patient then has lost what we call his reality testing ability.

One of the new basic ideas which has a great bearing on dentistry is the importance of the mouth in the development of our personality. We might first have to point out that it has become more and more evident that the different organs of the body have significance for us besides the purely useful functions which they fulfill. We may even go one step further and say that, in most instances, the emotional function precedes in time the useful functions. This is, of course, most evident in organs which directly or indirectly have sexual significance. The pride which man takes in his sexual abilities is, of course, far in excess of the utilitarian purpose of the organs involved. The amputation of a woman's breast is, in any case, recognized as a severe interference with her ego, even long after she is past the age where the breast would be expected to fulfill it's utilitarian purpose, namely nursing children. This last example will probably best illustrate the fact that the actual trauma a person suffers from a loss of an organ is by no means identical with the importance of the function of the organ. This applies to the teeth as strongly as to any other organ, in fact, more than to most other organs. Even if we view this problem of mouth and teeth only very superficially, we will notice that a lot of pride of the parents is expressed at the time when the child is teething. The number of teeth a child has is compared with other children of his age. The inevitable discomfort when teeth are cutting through is encountered with increased love and tenderness, with comforting and cuddling. Everything is done to comfort him. Such attitudes of parents must impress the child deeply. I might again remind you of what we already have said about the transference situation, the carry-over from the past into the present; for the patient, you, the dentist, may now become the person from whom the patient expects sympathy, comfort and encouragement, all the rewards he once received from his parents when he cut his teeth with pain.

The importance of the mouth becomes evident, also, when we consider the wealth of symptoms of mental unrest or emotional upset which are related to the mouth: viz., lack of appetite in depression, voracious appetite with obesity for emotional reasons, rage which distorts the mouth and facial expression, smiling and laughter, cannibalistic drives of the seriously disturbed, abnormal sexual practices, mutism, vomiting and nausea are all oral expressions of emotional factors. In other or earlier cultures the mouth plays an additional role: the soul enters or leaves the body through the mouth, which, in some cultures, is tied or stuffed when a person dies. The sexual significance of the mouth is not only expressed in kissing, but also in old beliefs and folklore that a maiden may

become pregnant by eating certain foods. Oral impregnation still plays a great part in the fantasies of children in dreams, in neurotics and psychotics. We may also mention here the grinding of teeth as an expression of hostility and bruxism, in sleep or dreams, as an expression of repressed hostility. Thumbsucking is a sexual gratification which, in some children, for certain reasons, may be kept up to the sixth or seventh year, or even longer. Also, the attraction of a pipe or cigarette is not entirely due to the tobacco, but to the pleasure that goes with oral activities connected with it.

Under these circumstances, it is not too strange that people usually are nervous when they think of the dentist and of the work to be done. Naturally, it is assumed, at first, that the nervousness is due merely to the anticipated pain and discomfort. However, it is quite apparent that the tension connected with a visit to the dentist is far in excess of the actual pain, especially to-day, when many anesthetics are available. One can observe that people, who will stand other types of pain rather stoically, may become tense in the dentist's chair. We realize to-day that any pertinent change regarding the mouth, any attack on it, if I may use that expression, is an unconscious threat to the basic personality and its structure, and thereby increases the neurotic defense mechanism which most people have, in a minor degree, employed anyway to protect them against the anxiety intrinsic in life in our culture, and maybe in any culture.

Why is it, then, that the mouth plays such an immense role in personality structure, in our feeling of security, self-respect, . self-acceptance?

On superficial consideration it seems apparent that the mouth serves the function of ingestion of food and of communication by spoken language. Actually, these are the most apparent, but, by far, not the most important functions which the mouth plays in our life. But since the most important psychological functions of the mouth are most prominent in earliest life, in babyhood, one may easily fail to account for them and to appreciate them fully. I will try to deduct these functions for you without engaging in professional parlance, for modern psychology is often blamed, and rightly so, in part, for obscuring facts by using high-sounding words which have little or no meaning to the uninitiated. But you will easily be able to see and understand modern concepts, if you will follow me closely, using common sense and normal imagination, meaning your ability to place yourself in a strange position. In other words, try to understand with your mature mind what it must be like to be in the state of a new-born baby. This is a state through which all of us went, and which, for good reasons, we have forgotten. Let us begin with imagining the state of mind in which a

child must be, shortly before birth. Let us not jump at the conclusion that it has no mind, or at least not a mind comparable to your own grown-up mind. For even with a fully mature, i.e. developed, brain, the fetus could not have a much different mentality, anyway. The world for this fetus ends where he himself ends, or at least within his reach, at the wall of the uterus. He has no experience that there is something that is outside of himself, that the world consists of two parts for each human being, i.e. the world that is "I" and the world that is "not I." Before he can understand this, he must experience it or, in other words, there must be a kind of communication between himself and the outside.

Technically, of course, such communication becomes possible at the moment of birth, when he leaves the comfortable uterus and enters the world. But how is such communication possible? For all practical purposes, the new-born baby is blind and deaf. Not that there is anything wrong with his ears or eyes. Acoustically and optically, he is born with perfectly working organs. But more is needed to see than eyes. One needs experience, memories with which one can compare the optical impression one gets so that one can recognize them, so that they may have meaning as symbols, as signs, and become intelligible. No such memories are present at birth, and, therefore, the newborn can make no use of his eyes or ears. The newborn still lives in complete isolation, unable to comprehend the world. His mother's care will keep him warm and softly bedded and so he will feel no discomfort.

Soon, however, there will be a new sensation, a sensation to which he is unaccustomed. It is an "inside sensation," the only kind of sensation he is used to from his intra-uterine life, but a new sensation, nevertheless. His mouth will become dry. Before birth, he lived in watery surroundings. His mucous membranes were always wet and comfortable. At birth, however, he changes to dry surroundings, to a life in air, where formerly water covered the mucous membranes. Now air, the breath, passes through, drying the mucosa. He feels uncomfortable, and gives expression to his distress by crying. Soon he will notice that when he cries, something happens from the outside. Something is pushed into his mouth, and his mucosa now again will feel wet and nice. Something happened which was not "I," but came from the outside. And so, in a way much more complicated than I would have time to explore here in detail, the first communication is established between the self and the outside world, between the self and other people.

It is obvious that this first experience must be of tremendous influence on the shaping of the personality, for early experiences and reactions set the pattern to later behavior. It is as if a record-cutting needle puts down a groove in the still untouched mind, a

groove on which a melody will be repeated again and again all through life. Was this early experience a happy one? Was it frustrating? Was the child comforted with love and thereby able to develop optimistic trust that the outside world will be helpful in distress? Was security thereby promoted? Was the child frustrated to the point where he received the impression that the world is hostile, that no help is coming? Was the mother inconsistent, sometimes a good mother and sometimes a bad mother, nervous and tense, impatient, so that the child never knew what would happen this time, when he cries, so that the child became distrustful, suspicious? These early experiences, the pacemaker for later life, all are acquired through contact with the mouth. It takes about ten weeks, before the child will learn by his experience, that a certain visual impression, the face of the mother, regularly appears when the breast is offered, and so begins to be able to use his eyes for meaningful recognition, later to be followed by sounds and by words. The first ten months are exclusively an oral period andmany psychiatrists assume that the most severe mental disturbance, schizophrenia, begins with a disturbance in this period; for if this first communication is abnormal, distorted, the subsequent personality development will show significant defects, which are hard to correct.

These considerations will, I hope, not only interpret to you the tremendous significance which, in our opinion, the mouth has for personality development, but it may also make you understand that we, to-day, consider mental diseases in a very different way from other diseases. We do not consider them as caused merely by a noxious outside agent, such as tuberculosis caused by the TB bacilli. We look at mental diseases as a kind of faulty interaction between the self and the surrounding, as something akin and still different from the normal, but different in degree, rather than in kind. We look at it as a part of the total personality, a result of life's experiences and the individual's reaction to these experiences. We all are born into a surrounding, a culture which is complicated, full of rules and laws and taboos, many of which are contrary to our primary needs and instincts. We have to behave, and are told and taught to do so from early childhood on. We have great advantages from this culture and civilization. It makes us human beings instead of animals. It gives us security we would not otherwise have. But in order to fit ourselves into this we have to sacrifice, give up satisfaction in exchange for security. Against our natural instincts (sex, aggressiveness, selfishness) we must defend ourselves, and we do so by repressing these unacceptable impulses. We exclude them from our consciousness. We do so in such a degree that the existence of many basic drives which we

share with the animal world may be unknown to ourselves, and we are therefore inclined to deny their very existence. Nevertheless, these drives are powerful and threaten a re-emergence into the conscious, especially in times of emotional or physical strain. Such a thread of re-emergence is felt as a free-floating anxiety, for we may not be able to account for the reason for our anxious feelings. It is this anxiety and the defenses against it with which we have to deal in psychiatry. All people have and employ such anxiety defenses. It is the question whether or not the defenses are effective and whether or not they keep us free from anxiety which often determines the borderline between mental health and disease.

The particular kind and combination of defenses used may determine the nature of a mental disease, or in normal limits may determine the character and behavior pattern of the normal or mildly neurotic person. It is all a matter of degree. Let us look then, at some of the character types and their defenses which you may see more commonly in your practice.

One of the most common types you will encounter is the obsessive compulsive person. These are people who have built a rigid structure around themselves and follow a rigid routine in their daily life as well as in their thinking. They become excited if somebody places their mail on the right side of their desks instead of the left side. These people may function very well in life and be successful. In fact, in some professions, such abnormal strict orderliness may be very useful. They may also make life difficult for their families and associates, but they themselves will often consider their way of life a virtue, rather than a vice. As patients, you will find them neat and orderly, but not very warm persons. An excessive amount of time may be spent by them on minor details. In some respects, they are ideal patients. They usually are punctual in their appointments, and they pay their bills. But the disturbance, with a necessary disruption of habits involved, and which may be inevitably during dental work, may increase their anxiety, against which the strict routine was a defense. They may then require reassurance, have to be complimented on their orderly and well-adjusted ways of handling themselves, and for their conscientiousness, and in this way their egos may be supported. They are usually sensitive people (though they may hide this). It is important, therefore, to be kind and tactful with them, but not necessarily warm. It is helpful to give exact explanations of the procedures planned in the treatment, as they will overcome their anxiety better when they know exactly what to expect and why things have to be done.

Another frequent type is the hysterical character. Today we do not think of them so much as theatrical persons, but rather as individuals characterized by their inclination to give symbolic signifi-

cance to everything and everybody. They express their emotions often by somatic symptoms, among which you may encounter gagging, nausea, vomiting. They are likely to form personal attachments to their physicians and dentist, with obvious complications. Often symptoms may persist in order to maintain the relationship longer, and when you have apparently successfully finished your job, unexplained pains or other disturbances may prolong the treatment. It may be frustrating to the physician or dentist to look for nonexistent reasons for these complaints if he is unaware of their functional character and their hidden symbolic meanings. You may be, for the patient, the person of authority, whose continued directions and orders the patient secretly wishes to enjoy. Here, too, kindness and tact will prevent hurting the patient's pride and self-respect. This has to be protected, lest the patient begin to show more serious symptoms to justify his behavior for himself and others.

We may also mention the rather typical group of hypochondriacs, dour, self-centered people. They usually are very communicative as to their many symptoms and sufferings, which may refer to almost any organ of the body, and of which they may talk endlessly. They are bothersome people, usually dissatisfied, and will change doctors frequently. They are often depressed, pessimistic in their outlook, middle-aged, disappointed by life or family. It is best to listen to them sympathetically, for the ventilation and discussion of their suffering is important to them. What you have to say will hardly interest them. The important point is that they will expect for their complaints a concrete medicine, no matter how silly their complaints may be. If they complain of a bad taste in their mouth, they need a mouthwash. They need a pill for their pain, a liniment, anything. Not to be taken seriously would be an intolerable blow to their ego.

There are too many types to be all mentioned here, but one more deserves special attention - namely, the aggressive type, who will try to get rid of his hostility by aggressive behavior and tactless, impertinent remarks. These people feel that only by "being strong" and aggressive can they be safe in life. They have contempt for those whom they succeed in impressing and hate those they cannot terrorize. They criticize everything and everybody. They try to bully all alike and make nasty remarks. One should be firm and friendly with them. The only way to handle them is to give them enough rope to hang themselves, by encountering their aggressive remarks with questions, expressing curiosity and interest. If they tell you that they think all dentists are crooks, you can, of course, throw them out, but it is very effective to ask them with interest on what experiences they base their opinion. They may dig out some

distorted experiences they claim they had, or, more likely, they claim their uncle or grandfather had, but in any event, it will keep their minds happily occupied for quite a while, and they will feel that you may be an exception as you were willing to listen in an "unprejudiced" manner to their "legitimate" complaints, while others immediately answered them with an authoritative denial that any dentist could be a crook.

It is, in any case, a good way to handle people if you are not sure how to treat them - by asking them questions about the statements they have made. It is a non-offensive way, which shows interest and give you time to think things over. With all neurotic cases, kindliness and firmness usually are the best policies. It is not very likely that you will encounter psychotic people in your office but borderline cases will be frequent. While they will impress you as odd and bizarre in their behavior, they are not hard to treat. In fact, hospitalized patients are supposed to be easier to treat than normals.

The variety of borderline psychotics is far too great to be discussed here. It was more my intention to give you an idea of the psychiatric implications which are connected with the mouth as an organ and which may make you aware of aspects of your work which are not so evident and apparent to a casual observer. I am sure, and many share that opinion, that a certain amount of basic psychiatry, or at least of basic psychology will, in future years, more and more be included in the training programs for dentists. The importance of interpersonal relationships in the practice of dentistry can, in my opinion, not be overestimated. Such understanding of basic principles will, it is hoped, be helpful in the successful practice of dentistry.

HYPNO-ANESTHESIA IN MEDICINE*

EDWARD H. KOPF, B.A., M.D.**
Buffalo, New York

A renewed interest in the various aspects of hypnosis in medicine and its allied arts is indicated by the number of recent papers appearing in scientific journals as well as the lay press.

Twice before, hypnosis has aroused the interest of medicine. In the early 19th century, Mesmer stimulated much curiosity by the re-introduction of hypnosis to medicine. Following this, many reports of the successful application of hypnosis for surgical anesthesia were published. The introduction of ether by Long in 1842 and the subsequent development of dependable chemical anesthetics spelled the end to hypnosis' vogue as a surgical anesthetic. Later, toward the end of the century, hypnosis had a brief flirtation with psychiatry. When Freud turned to free association, after several years of successful application of hypnosis, most of his disciples also abandoned hypnotic techniques.

The reasons for which other areas of medicine gave up hypnosis are more obscure, but very significant today. One must merely consider what must have happened during that era of limited knowledge about the etiology and pathology of illnesses, when these early investigators used hypnosis to suppress symptoms, only to find that the underlying disease process had not been altered and it becomes quite apparent why hypnosis was considered too dangerous to use.

We may credit the current comeback of hypnosis as a therapeutic tool to its usefulness during World War II as a psychotherapeutic short-cut in the treatment of acute psychiatric problems secondary to wartime traumas.

Most of the authors contributing to the current literature concern themselves with the use of hypnosis as an anesthetic agent. The majority of these papers consider the conditions and situations in which these principles will prove most effective. A few investigators try to determine the extremes of applicability. Little is written about trance induction techniques since these have become quite standard in such areas as elective minor surgery, obstetrics, dentistry and psychiatry. However, the specific techniques employed must be chosen with insight into the particular field of trance utilization.

The remainder of this paper will concern itself with the various areas of application of hypnosis in medicine as I know them today.

*Read at the Annual Meeting of the American Society of Psychosomatic Dentistry, March 24, 1957
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HYPNO-ANESTHESIA IN SURGERY

In surgery, hypno-anesthesia is being more commonly used during minor surgical procedures. It has been found highly effective in carefully selected and trained subjects during certain major operations.

As early as 1850 Esdaile(8) reported several hundred surgical procedures performed under hypno-anesthesia alone. All these operations were witnessed and carefully documented. They included amputations, removal of scrotal tumors, cauterizations and other painful procedures.

For a long time, only occasional reports of surgery under hypnosis were made. Recently, more papers such as Dr. Goldie's report of 26 orthopedic procedures under hypno-anesthesia are again appearing. Most of them report the use of hypnosis as an adjunct to chemo-anesthesia, but there are occasional case reports of major surgical procedures under hypno-anesthesia alone.

I have found these techniques most useful in initial treatment of traumatic injuries, debriedment and suturing of lacerations, initial debriedment of extensive traumatic facial tattooing, removal of foreign bodies such as glass, needles and splinters from under the skin of various parts of the body as well as from under the nails, the removal of fishbones from the pharynx of gaggers and the placement of packs for epistaxis.

Hypnosis is valuable in the relief of pain from all types of fractures: noses, ribs, vertebrae, hips and extremities. It is useful for relief of pain during application of traction, traction devices and casts.

I have used it as the only anesthetic in the reduction of collies fractures, dislocated shoulders and various other fractures.

Hypno-anesthesia has helped me make exact diagnosis by facilitating X-ray examination of painful fractures and the determination of tendon and nerve damage in painful hand injuries.

Suggestion facilitates instrumentation of body orifices; bronchoscopy; tracheal aspiration, especially during a post-operative period; gastroscopy; proctoscopy; sigmoidoscopy; cystoscopy; and the passage of urethral catheters and naso-gastric tubes.

Hypno-anesthesia is invaluable as an adjunct to many procedures such as the relief of pain secondary to anoxia in an extremity rendered bloodless by the application of a tourniquet in order to provide a dry field for surgery.

Probably the most extreme form of pain that I have handled with hypnosis are three cases of urethral calculous.

I have attempted no major surgery under hypno-anesthesia, but other men have reported such cases. There is one report of a Caesarean section followed by a hysterectomy under hypno-anesthesia

alone, as well as a radical mastectomy and a thyroidectomy. Another report mentions the use of hypno-anesthesia coupled with local anesthesia in pre-frontal lobotomies and other craniotomies. Although these reports are to be found in the literature, I have been content to confine my use of hypnosis to the pre-operative and post-operative period in the care of major surgical cases.

FACTORS INFLUENCING THE USE OF HYPNOSIS PRE-OPERATIVELY

An integrated nervous system is constantly bombarded by millions of stimuli. Only a few of these stimuli finally reach conscious centers for interpretation. Intense stimuli reach higher centers quickly under normal conditions. This is also true of those subtle stimuli which learning and conditioning have taught the organism to regard as threats to its integrity. Any surgical procedure stimulates many kinds of sensory nerves - heat, pressure and proprioceptive nerves as well as many pain fibers. Fear and apprehension may result in the interpretation of all these sensations as pain. Stimuli perceived as pain are pain, and must be treated as such. In other words, fear and apprehension can lead to sensations of pain out of proportion to the magnitude of the surgical procedure.

Because of this, it has been common practice for surgeons to reassure their patients before and during surgical procedures, and to point out the true nature of their sensations. This makes the procedure less formidable and decreases the amount of chemical anesthesia required. Pre-operative sedation is used for much the same reason. Those using hypno-anesthesia in surgery are well aware of the same factors.

Schultz(7) introduced a technique of hypno-anesthesia which includes the pre-operative description and rehearsal of the entire surgical procedure to be performed while the patient is in a deep hypnotic state.

It is said that learning and conditioning under hypnosis removes the fear of the unknown and protects the patient from fear, tension and surprise, and that the threshold to pain perception in higher centers is raised more than with other hypnotic techniques.

I have used this technique in only a few cases, but have found it highly satisfactory. A number of papers report the use of this technique of hypno-anesthesia for major surgical procedures. In the most recent of these, Kroger discusses the performance of a Caesarean section and complete hysterectomy with hypnosis as the only anesthetic agent.

It is apparent that hypnosis will never be a substitute for chemo-anesthesia for major surgical procedures since only about 10% of

carefully selected patients can develop this kind of anesthesia. Hypnosis is, however, very effective in potentiating the effect of local or general anesthesia so as to reduce the quantity of medicament needed.

Hypnosis can be used very effectively pre-operatively to allay fear and tension and to facilitate the induction of inhalation anesthesia. Because of the profound relaxation, valuable time is saved and anoxemia is reduced. The traditional pre-operative administration of morphine, meperidin (demerol) and pentobarbitol sodium can often be eliminated, even in those patients who enter only a light stage of hypnosis. This is important since, as Beecher has shown, these agents, even in minimal doses, produce some degree of respiratory depression and lower blood oxygenation. The same investigator has shown that, even aside from their danger, pre-operative narcotics are actually not necessary. During a carefully controlled study, experienced anesthetists could not distinguish between patients treated routinely and those given a placebo with the suggestion that it would produce the same specific effects. Since simple suggestion works so well, it is obvious that the use of hypnosis would be even more effective.

HYPNOSIS IN THE POST-OPERATIVE PERIOD

Hypnosis is valuable, post-operatively, even after chemical anesthetics. Post-operative retching can be decreased. The speed with which good hypnotic subjects can re-enter deep hypnotic trance states makes it possible to relieve pain quickly. Patients under hypnosis can cough quicker, thus decreasing the complications of post-operative atelectasis and pneumonitis. Because of the extreme relaxation in the trance state, trachio-bronchial aspiration of mucous is also easier to accomplish. Breathing and coughing can be controlled more effectively than usual, utilizing post-hypnotic suggestions. Suggestions can also be made to decrease the frequency of post-operative urinary retention.

The patient's attitude toward his disease can be altered to help him cooperate better in certain necessary procedures. Pertinent to this aspect of post-operative care is the recent report by Crasilneck(13) in which he states that "wound healing in severe burns can be hastened by increasing caloric intake when pain is controlled by hypnosis rather than appetite-depressing opiates."

Earlier ambulation of amputees is reported when time-distortion under hypnosis is used to acclimatize the patients to their prostheses earlier.

HYPNO-ANESTHESIA IN OBSTETRICS & GYNECOLOGY

Along with the appreciation of the physician-patient relationship

in childbirth, the need for release from fear and apprehension, "suggestive relaxation" and natural childbirth, many obstetricians have demonstrated a marked increase in interest in the scientific application of hypnosis to their particular problems.

De Lee writes, "relaxation during delivery, in some patients, is best obtained by hypnosis. It is the only anesthetic without danger. I am irked when I see my colleagues neglect to avail themselves of this harmless and potent remedy."

Kroger and De Lee(2,3,4,5,6)) outlined the advantages of hypnosis in obstetrics in one of their papers, and I quote: "1.Because the patient is treated in an unusual and special manner, and because suggestibility is present, she is likely to have a more pleasant pregnancy, free from the ordinary discomforts of this condition, such as nausea, pressure and cramps. 2.Fear, pain and apprehension before and after labor are eliminated. 3.It is possible to allow a mother to experience the sensation of childbirth without attendant pain. 4.Uterine contractions can often be either accelerated or retarded by suggestion. 5.Blood loss is considerably reduced by capillary constriction. 6.Elimination of pain lessens and helps recovery. 7.The responsive patients cooperate fully, this being particularly valuable during the expulsive stage. 8.There are no undesirable post-hypnotic effects, as with most other anesthetics. 9.In premature deliveries, hypnosis is especially advantageous, because it reduces fetal anoxia. 10.It raises resistance to fatigue, minimizing maternal exhaustion. 11.It is indicated in persons allergic to chemical anesthetics. 12.Chemical anesthesia, especially ether, depresses uterine activity and interferes with the normal mechanisms of labor; hypnosis does not. 13.The first stage of labor can be reduced. In a controlled study by Abramson and Heron(14), the first stage of labor was reduced approximately two hours in primipara. Midoll(15) reported an average reduction of the first stage of labor of four hours in primipara and about 15 minutes in multipara. Midoll further points out that the second stage of labor, in his series, was reduced by one hour in primiparas, with insignificant change in multiparas."

HYPNOSIS IN INTERNAL MEDICINE

In Dr. Bernard Raginsky's review of the use of hypnosis in the field of internal medicine, he states that hypnosis will prove most effective in cases where symptoms are primarily emotionally determined, such as peptic ulcer, ulcerative colitis, asthma, anorexia nervosa and organic heart disease complicated by fear and emotional disturbances.

Because of my special field, I have handled less medical prob-

lems than surgical. This is primarily determined by my belief that one should not use hypnosis to alter the symptomatology of a disease with which he is not completely familiar, because of the most subtle implications of symptomatology. It is for the same reason that I believe a psychiatrist or other well trained person should handle psychosomatic problems.

Despite these reservations, I have, on occasion, assisted in allaying the fear and apprehension in patients with myocardial infarctions, so that they could gain the most benefit from the conventional treatment they were receiving. I have found hypnosis similarly effective as an aid in the treatment of paroxysmal auricular tachycardia.

Occasionally, I have employed it as a temporary relief of pleuritic pain during treatment of pneumonia, pneumonitis and pulmonary embolism so that the afflicted patient might gain some much-needed rest without the use of respiratory depressing narcotics. It must be stressed that, in cases like these, the symptoms should be alleviated only temporarily, since pleuritic pain is one of the symptoms used as a criterion in judging the progress of the underlying disease.

On many cases, I have used it to augment the emergency treatment of status asthmaticus with conventional drug therapy.

DISCUSSION

There is little doubt that hypnosis can produce effective anesthesia in selected cases. Although men in various fields of medicine have done considerable work with hypnosis, the technique is not, as yet, a part of everyday medical treatment. There are many reasons for this.

1. Foremost is the fact that most physicians have never had first-hand acquaintance with hypnosis in the practice of medicine.

2. Physicians, as a group, are reluctant to use techniques which are not easily understood, and certainly our knowledge of human behavior is still inadequate at present. Physicians continue to resent psychoanalysis and psychosomatic medicine, and we may expect hypnosis to undergo even further critical evaluation.

3. As has been stated, about 90% of all people are susceptible to some degree of hypnosis. However, only 10-25% can develop enough anesthesia for major surgical procedure. It depends on the skill of the operator, the susceptibility of the patient and, most important, the motivation of the patient.

4. Time is needed to develop sufficient rapport and depth of trance for surgery.

5. During parturition, a trained operator should be present throughout much of the labor, unless the patient has been trained in auto-hypnosis.

6. Psychotics, borderline psychotics and other deeply disturbed people are different to deal with at any time. It is very doubtful that hypnotizing one of them would create any danger, but the operator might very likely be held responsible for a psychotic episode, just the same.

7. Some physicians have a fear of failure in many areas of therapy.

8. The use of hypnosis requires a change in techniques, and some physicians resist change.

9. An unusually strong bond may develop between the patient and the therapist. This is true of all forms of therapy. However, as with other forms of treatment, when the motivation of the patient decreases, as his disease becomes corrected, this bond breaks down and rapport is lost.

The mechanism of hypno-anesthesia is, as yet, poorly understood. Electronographic studies, however, indicate that during deep hypnosis, pain is perceived in the tissues,but noxious stimuli do not reach pain receptors in higher centers.

Another poorly understood phenomenon is the mechanism which functions during hypnosis to prevent or eliminate neurogenic shock.

Hypnosis is a many-faceted tool. Its use can be broadened by conjunction with chemo-anesthetics. This combination proves more acceptable to many people. Though a practitioner may choose never to employ hypnosis himself, it is important that he gain insight into the profound effect that his spoken words can have on the morbidity associated with the illness he is treating.

The indications and contra-indications for the use of hypnosis in medicine are identical with those broad principles governing any form of medical therapy.

1. Hypnosis is used only as an adjunct to correct treatment. Hypnosis can be used to change the morbidity of many diseases, but it has never been shown to correct the underlying pathology of any disease. For example, hypnosis, like morphine, can be used to suppress the pain of a fracture and thus alter correct treatment, but the elimination of pain alone never healed a fracture. This is a rather obvious example, but the same principle applies to more subtle situations. In angina pectoris, the elimination of pain does not correct the damaged coronary arteries. It may even allow overexertion and so compound the injury. By the same token, it is recognized that the suppression of physical expression of psychic disturbances does not correct the pathology. It merely lulls one into a sense of security until the still-smoldering problem suddenly

erupts in the form of some other symptom, perhaps more incapacitating than the first.

It is difficult for any man in so broad a field as medicine to fully appreciate the subtle ramifications of disease processes that all symptoms represent.

It is for this reason that men in one specialty of medicine often refuse to employ hypnosis to suppress symptoms of diseases they do not normally handle. This brings us to the second basic principle in the use of hypno-therapy.

2. No symptom is suppressed until its etiology is definitely diagnosed and a specific form of treatment outlined. In addition:

3. No symptom necessary as a criterion of progress of a disease process is eliminated.

Since only those trained in psychodynamics can diagnose the etiological maladjustment that hides behind a psychosomatic symptom, I again emphasize that the use of hypnotic techniques must be limited to people trained in the field of medicine to which the techniques are to be applied.

SUMMARY

The number of papers appearing on the subject in all fields of medicine indicate a recent resurgence of interest in the role of hypnosis in medicine.

Hypnosis definitely inhibits noxious stimuli, which the electronograph demonstrates are perceived peripherally, from reaching higher centers, and by this means increases the adaptive response to stress. The absence of surgical shock when patients are under hypnosis has been repeatedly reported. Although many theories exist, no adequate physiological explanation of these phenomena has been made to date, and future investigation is necessary.

Hypnosis has a much wider field of application when used as an adjunct to chemo-anesthesia. In this role, the traditional use of pre-anesthetics can be completely eliminated in many cases, thus, decreasing the tendency to develop respiratory depression. The total quantity of chemical anesthetics can be reduced because of the marked muscle relaxation. Post-operative pulmonary complications are decreased by relief from pain interfering with normal respiration. Improved nutrition facilitates wound healing.

In obstetrics, it is considered by some to be the logical extension of natural childbirth.

The reasons for the reluctance of some physicians to employ hypnosis are discussed. Though a practitioner may elect never to employ hypnosis himself, it is important that he gain some insight into the profound effect that his spoken words can have on the morbidity associated with the illness he is treating in his patient.

The cardinal rules governing the use of hypnosis in medicine are stressed. Hypnosis is used only as an adjunct to correct treatment. No symptom is suppressed until its etiology is definitely diagnosed and a specific course of treatment outlined. No symptom used to judge the progress of a disease is eliminated.

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THE PHYSIOLOGY OF HYPNOSIS. I.*†

A Review of the Literature

BY BERNARD E. GORTON

Introduction

This paper purposes to discuss the physiological aspects of the hypnotic state, and to examine the physiological changes transcending ordinary voluntary capacity which can be produced through hypnotic suggestion. Hypnosis may be defined as an artificially-induced state characterized by heightened suggestibility, as a result of which certain sensory, motor, and memory abnormalities may be induced more readily than in the normal state. Hypnosis is induced by means of appropriate verbal suggestions. There will be no discussion here of the twilight states of consciousness resulting from the action of such drugs as the barbiturates. A review of the history, technic of induction, and the phenomena of hypnosis lies outside the scope of this paper; excellent reviews of these subjects are available, and the reader is referred to them.**

Hypnosis is essentially a psychosomatic phenomenon, that is, it involves the close interaction of factors which are ordinarily dichotomized into "physiological" and "psychological" categories. This distinction is permissible as a matter of convenience only, and it must be realized at the outset that such an artificial division does violence to the concept of the unity of the organism which is fundamental to sound thinking not only in medicine but in all the biological sciences. This orientation along psychobiological lines is particularly essential in the study of the higher functions of the human nervous system, and it has been well stated by Liddell that

*This is Part I of a three-part paper on the physiology of hypnosis. It includes an introduction to the subject; notes on theor of hypnosis and on methodological problems during experiment; and discussion of the electroencephalogram, metabolism, respiration, and circulation during hypnosis. Part II will cover the vasomotor activity and hematological changes during hypnosis; physiology of the gastro-intestinal system, kidney function, muscular activity and reflex activity during hypnosis; and pharmacological aspects of hypnosis. Part III will cover hypnotic anesthesia; hypnosis in psychosomatic research; physiological changes associated with hypnotic age-regression; a general conclusion; and an extensive bibliography. Part II will be published in the October 1949 issue of The Journal of the American Society of Psychosomatic Dentistry.

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**The best short discussion of hypnotism readily available is that of Jennes (1944). Hull's monograph (1933) is a milestone in the history of experimental hypnosis. The recent two volumes by Wolberg (1948) are unexcelled as an authoritative reference on all medical aspects of hypnosis.

"Our understanding of the nervous system will speedily increase when both physiologist and psychologist acquire, through practice, facility in ignoring the imaginary barrier between the two sciences."*

The study of the physiology of hypnosis involves problems not ordinarily encountered by the physiologist, and the methodological difficulties that have to be mastered in order to obtain significant and reliable data are considerable. Much of the early work in the field of hypnosis was done by clinicians unwilling or unable to apply rigorous scientific controls to their investigations. It was not until Clark Hull published his epoch-making monograph in 1933 that the study of hypnosis became scientifically respectable in this country. It is well to note that much of the pioneering work on the physiological and clinical aspects of hypnosis was done in Germany and Austria; this is in keeping with the fact that the majority of references cited in Dunbar's survey (1935) of the literature on psychosomatic interrelationships is in German. Workers in this country appear to have been reluctant to make use of a technic which is still unfortunately associated in the minds of many with stage magicians and side-shows.

Lately there have been encouraging signs of a reviving interest in the clinical and experimental use of hypnosis. It is not improbable that the publication of Wolberg's recent (1948) two volumes on *Medical Hypnosis* will mark a change of medical opinion in this country from a blend of suspicion and ignorance to a mature appreciation of the advantages of hypnosis. It is to be hoped that the future will see an increasing use of hypnosis in basic physiological studies of psychosomatic problems; it is to the end of furthering an intelligent understanding of the physiology of hypnosis and its potentialities in physiological research that this paper is dedicated.

Theories of Hypnosis

At present there is no physiological theory available which accounts satisfactorily for the phenomena encountered in the hypnotic state. This is hardly surprising in view of our ignorance regarding the nature of the physiological mechanisms associated with the cortical functions of learning, memory, language, and related symbolic processes. It is interesting to note, parenthetically, that the psychologists have been no more successful in dealing

*Fulton (1943, p. 510).

with hypnosis from a theoretical standpoint than have their physiological colleagues. Hull (1933) has attempted to account for the hypersuggestibility observed in hypnosis on the basis of a "habit hypothesis." Other authors have attempted to deal, more or less unsuccessfully, with the crucial question of why the hypnotized individual acts the way he does, but an adequate explanation still remains to be proposed.*

The only physiological theory which can make any claim to being comprehensive, that of Pavlov, has definitely been shown to be untenable. It is discussed here mainly because it embodies a large number of fallacies which are still frequently encountered in the literature, and because it is an excellent example of the fatal results which occur when theoretical concepts having little or no experimental basis are applied indiscriminately to "explain" a set of facts. Pavlov was firmly convinced that "inhibition," ordinary sleep, and hypnosis are one and the same process:

"Inhibition is partial sleep, or sleep distributed in localized parts, forced into narrow limits; true sleep is a diffused and continuous inhibition of the whole of the hemispheres . . . From this point of view the phenomenon of hypnosis may be easily understood. It represents one of the different steps in the process of irradiation over the mass of hemispheres—the partial sleep of the hemispheres."**

Elsewhere, Pavlov (1923) states that "hypnosis is inhibition spread over the usually active points in special areas of the great hemispheres." It is remarkable how little such writers as Altshuler (1927), Biermann (1929), and Stockert (1930) have added to the fundamental concepts of Pavlov cited here. Even if Pavlov's idea of "inhibition radiating over the great hemispheres" had not been shown to be fallacious (Hilgard and Marquis, 1940), the "facts" upon which he bases his theory of hypnosis are frequently in error. In the first place, hypnosis and sleep are now definitely known not to be identical so that the concept of hypnosis as "partial sleep" is false. Pavlov follows the opinion of earlier authors who consider the phenomenon of tonic immobility encountered in animals ("animal hypnosis") to be related to hypnosis in the human subject. This view is based upon the mistaken

*For the psychological status of hypnosis, the reader should consult the reviews of P. C. Young (1926, 1931, 1941).

**Cited by Hull (1933, p. 210).

notion that catalepsy forms an integral part of the hypnotic state. Hull (1933) has shown that catalepsy may be readily induced in the waking state and he observes:

"Catalepsy is never observed in the writer's laboratory unless specific instruction is given that it will take place. By this criterion, touching the end of the nose with the tip of the right index finger might also be regarded as a symptom of hypnosis as such, since in the hypnotic state it also can be induced quite as readily as catalepsy. Moreover, catalepsy can be induced with remarkable readiness in subjects in the normal waking condition previous to the giving of any other suggestions whatever."*

Similar arguments may be applied to the contention that *rapport* is a special feature of the hypnotic state. Hull points out that rapport is actually a form of selective anesthesia, and thus does not differ fundamentally from the other forms of anesthesia which may be obtained if suggested by direct or indirect means.

Not only do we find that Pavlov's theory of hypnosis is contrary to the experimentally-established facts, but it is actually based upon neurophysiological conceptions such as the "irradiation of inhibition over the great hemispheres" which can hardly be regarded as adding to our knowledge of the fundamental problems involved. It may safely be concluded that a theory of hypnosis which can account satisfactorily for the experimentally-determined facts will have to await the formulation of a general theory of the psycho-physiological correlations of higher cortical function, an event hardly to be expected within the near future.

Methodological Problems in Experiments Involving Hypnosis

Research in the field of hypnosis has been beset with a number of special problems not usually encountered by the physiologist. The induction of hypnosis involves an intimate interpersonal relationship between operator and subject that is not capable of easy standardization. All subjects do not behave alike in the hypnotic state, and much depends upon the operator's skill as far as the depth of trance produced is concerned. We do not possess any objective somatic criteria of hypnosis, and the depth of hypnosis which can be achieved varies considerably in different subjects. A number of authors have described scales designed to measure the depth, but no general agreement has been reached concerning

*Hull, *op. cit.*, p. 211.

the standardization of such a scale.* The factor of operator skill is an important one in inducing maximum depth of hypnosis in a given subject, and it is probable that many of the contradictory results in the literature are to be ascribed to the variation in the susceptibility of different subjects and the ability of different operators to induce maximal depth of trance.

The lack of waking-control experiments in much of the literature on hypnosis has been criticized by Hull, and waking controls are indeed indispensable in any study which purports to determine the effectiveness of hypnotic suggestion in bringing about physiological changes as compared with the effects of suggestion in the waking state. Yet this simple precaution has been omitted by numerous investigators whose results have been invalidated thereby. Many of the earlier investigators failed to introduce controls designed to test whether the subject is in the hypnotic state or whether he has fallen asleep. Accordingly, many findings which supposedly show certain phenomena to be identical in sleep and hypnosis actually merely demonstrate that the subject has fallen asleep because of the neglect of the experimenter to guard against this occurrence. Unless some such precaution as that used by Bass (1931) in his classical demonstration of the integrity of the knee jerk during hypnosis (the knee jerk is abolished by sleep) is employed, an experiment involving the use of hypnosis cannot be regarded as satisfactory.

That the mode of induction of hypnosis may affect the experimental results is indicated by the work of Davis and Kantor (1935) who found a significant difference to exist in the skin resistance during "active" and "passive" hypnotic states. They found that the skin resistance during the lethargic state of hypnosis resembled that of sleep, while the resistance during the active condition resembled that found in the waking state. Quite as important as control experiments in the waking state are controls in the hypnotic state without the giving of suggestions designed to produce the effect being studied. Luckhardt and Johnston (1924) found that the induction of hypnosis *per se* was capable of causing a rise in gastric secretion; this rise was clearly noticeable on the secretion curves obtained by earlier investigators who were, however, unaware of the true nature of the phenomenon.

*A number of such scales are discussed by Jennes (1944).

In studying the effect of emotions upon physiological processes in the hypnotic state the question of presenting emotionally equivalent stimuli to different subjects is a difficult one. Dunbar has justly pointed out that, strictly speaking, there is no such thing as an emotionally neutral stimulus. Rather frequently, the stimuli required to bring about a maximal emotional response in a given subject are highly individual and personally determined, and vary widely from those effective in a different subject. It is obvious that the suggestion "Your pancreas will secrete insulin and your blood sugar will fall" (employed by a number of investigators who wished to influence blood sugar by hypnotic suggestion) is highly ineffective, and the suggestion of a strong emotional experience having a personal meaning to the subject will produce results quite different from those obtained with the suggestion just mentioned. Dunbar comments on this matter as follows:

". . . Grafe realized that psychic factors were responsible for some of his negative results. Negative results in hypnotic experiments are to be ascribed only too often to faulty technique, that is, to lack of judgment in the choice of suggestions. Probably no one has had wider experience with hypnosis in psychosomatic research than G. R. Heyer who says, 'It is essential that the suggestion be adapted to the individual. The key must fit the keyhole in order really to open the door into the inner world. . . .' "*

To summarize, the methodological problems involved in the use of hypnosis are considerable and account for much of the contradictions to be found in the literature. If the effects of hypnosis are to be investigated, it is essential that hypnosis and *not* sleep be studied, and suitable precautions are necessary to that end. It is highly desirable to standardize the method of induction of hypnosis, preferably by a period of training following which hypnosis may be induced at a prearranged signal by the operator. Controls are necessary both in the waking state and in the trance in order to establish that the effect under investigation is actually due to hypnotic suggestion and not to other secondary factors. In studying the effects of emotions suggested under hypnosis, care must be taken that the emotional stimuli are effective and adapted to the subject. It is highly desirable to estimate the depth of hypnosis quantitatively, using one or the other of the available scales, and it is never permissible to assume that the hypnotic group is

*Dunbar (1935, p. 172 n)

homogenous as to hypnotizability or that hypnosis is an absolute state without variations. Hull (1933) has drawn attention to the fact that hypnosis is a habit phenomenon and that the phenomenon of substitution of stimulus is responsible for many motor responses which may have been acquired without the knowledge of the subject and serve to confuse the meaning of results. Thorough training in experimental human behavior is necessary for success in the field of experimental hypnosis, and the following words of Binet and Fere (*Animal Magnetism,* 1888) are still highly appropriate:

"The study of hypnotism bristles with difficulties, although this has never occurred to the numerous persons who have expected to find in these questions the occasion of a brilliant and easy success. Although nothing is more simple than the invention of dramatic experiments, which strike the vulgar with fear and astonishment, it is on the other hand very difficult, in many cases, to find the true formula of the experiment which will give its results with convincing accuracy."*

The Electroencephalogram in Hypnosis

Ever since Berger first reported his now classical work on the cortical electro-activity in man, physiologists and psychologists have attempted to discover the correlation between the electroencephalogram and various normal and abnormal functional states of the cerebral cortex. The fact of primary importance which the study of the electroencephalogram has disclosed is that the electrical activity of the cerebral cortex is the same in hypnosis as it is in the waking state, and that it differs from that which is observed during sleep. The electroencephalogram therefore provides a readily available means of distinguishing hypnosis from sleep. This is of considerable importance since most of the older authorities on the subject believed hypnosis and sleep to be identical states from a physiological standpoint.** While the experimental evidence is overwhelmingly in favor of the thesis that sleep and hypnosis are *not* identical, many authors still subscribe to the older view that hypnosis and sleep are the same, or closely allied, conditions. This latter opinion forms the basis of Pavlov's

*Cited in Hull (1933, p. vii).

**A good review of the conflicting opinions concerning the identity of sleep and hypnosis is found in Hull (1933).

theory of hypnosis which is widely held by the Russian and German reflexologists, and which is also shared by such American investigators as Kubie and Margolin (1944). We are fortunate in possessing an instrument such as the electroencephalograph which makes possible an objective differentiation between sleep and hypnosis.

Loomis, Harvey, and Hobart (1936a, 1936b) first reported that cortical electro-activity, as measured with the electroencephalograph, was identical in the waking state and hypnosis. Using a single subject who was capable of being placed in deep hypnosis, these authors found that "the trains characteristic of a person awake remained at all times during hypnosis and no spindles or random waves (characteristic of normal sleep) appeared during any of the tests." This finding was confirmed by Blake and Gerard (1937) who state that in their experimental subject "a good 10/second rhythm was normally present and persisted, sometimes with diminished amplitude, throughout the hypnotic period. A 14/second rhythm was observed, but the very slow waves of sleep were never definitely indicated." Sirna (1945) could find no significant electroencephalographic changes on the cortical level during normal daydreams, hypnotically-induced daydreams, and hypnosis itself, and he concludes that his results confirm the work of Loomis, et al.

More recently, Dynes (1947) has made careful studies, on five subjects, of the electroencephalogram in the waking state, hypnosis, and sleep. His criteria for deep hypnosis included post-hypnotic amnesia, hypnotically induced anesthesia, and the carrying out of post-hypnotic suggestions. Dynes concludes that "there is no evidence that the cortical electrical activity, as shown in the electroencephalogram, was altered, either at the time of induction of the trance or later when the patient was in deep trance." Of special interest is an electroencephalographic tracing reproduced in the original report which shows the brain waves recorded from a subject who had been trained to enter the trance state almost instantaneously at a prearranged signal by the operator. No essential change in the electroencephalogram is discernible before, during, or after the induction of hypnosis which, judging from the time signal on the record, took place in approximately three seconds. Ford and Yeager (1948) reach the same conclusion in a study involving eight subjects: "Hypnosis, *per se*, does not affect

the cortico-electrical physiology as recorded by the electroencephagraph. . . ." These authors further note that ". . . changes in the emotional state of some subjects through hypnosis can modify the electrical activity."

A more controversial aspect of the electroencephalogram in hypnosis is the effect which hypnotically-induced modifications of seeing and hearing (auditory and visual hallucinations produced under hypnosis) exert on cortical electro-activity. It is well known that opening of the eyes in a bright room immediately abolishes the alpha rhythm of the electroencephalogram, and that the latter reappears promptly when the subject closes his eyes. Loomis et al. found that they were able to cause the alpha waves to reappear by the suggestion of blindness in a subject whose eyes had been taped open.

On the other hand, it was never possible to start "trains" in a non-hypnotized subject by suggesting blindness to him while his eyes were open in a lighted room. These studies by Loomis and his associates would seem to indicate that hypnotically-induced blindness is successful in producing electroencephalographic changes which cannot be brought about by waking suggestion.

The results of Loomis et al. could not be repeated in experiments done by Lundholm and Löwenbach (1942-43). These authors concluded from a series of experiments involving three subjects that: "Hypnotically suggested light does not produce the abolition of the alpha rhythm, nor does suggested blindness prevent it. . . . The findings in these experiments tend to convince us that cortical electroactivity is not affected by hypnotic modification of seeing and hearing." Lundholm and Löwenbach cite the work of Lemere (1942) with hysterically-blind persons in support of their findings. Lemere found that several hysterically-blind subjects showed no alpha waves when their eyes were open, but that the rhythm returned promptly when they closed their eyes. A hysterically-blind individual, examined by Lundholm and Löwenbach, who was later relieved by hypnosis, exhibited the same behavior reported in Lemere's patients, and these authors conclude, "We are unable satisfactorily to account for the discrepancy between our results and those of Loomis, Harvey, and Hobart." Ford and Yeager (1948) confirm the findings of Lundholm and Löwenbach in a study in which they induced hypnotic

blindness in three subjects and were unable to produce a change of electro-cortical activity.

Electroencephalographic changes produced through hypnotic age-regression are reported by Kupper (1945). This author describes the case of a 24-year-old maritime service trainee who was hospitalized in December 1943 following a convulsive seizure with tonic and clonic movements. A history of similar attacks dated back to 1938 when the initial convulsive attacks had occurred and "diffuse abnormalities on the EEG indicative of a convulsive disorder" had been noted. In December 1943 similar diffuse cortical irregularities were noted electroencephalographically. Under hypnosis it was disclosed that the first convulsive attack of the patient had occurred in 1938 under psychologically traumatic circumstances. The patient was then regressed while under hypnosis to his twelfth birthday and serial EEGs were taken. The EEGs proved to be within "normal limits" from the twelfth birthday through succeeding years up to the patient's eighteenth year in 1938, following the first attack. Then diffuse cortical abnormalities occurred. "By suggestion the patient was placed in the situation prior to the initial attack. . . . More irregularities, abnormalities and slight spiking occurred. The record was then changed within normal limits by reassuring the patient and the series repeated. *A convulsive seizure was produced and stopped while under hypnosis on suggestion of the examiner.*"

In summarizing the effects of hypnosis upon cortical electroactivity, it appears definitely established that the electroencephalogram under standard conditions is identical in hypnosis and the waking state. The weight of evidence at present favors the view that hypnotic modifications of hearing and seeing are not capable of influencing the normal electroencephalogram. The work of Ford and Yeager (1948) indicates that emotional changes produced during hypnosis are capable of bringing about changes in the EEG. This is in accordance with the views of Davis and Davis (1939) who conclude that "the psychological 'set' . . . is as important in determining modifications of the alpha rhythm as is the background of proprioceptive impulses in determining spinal reflexes." Thus it would seem that changes in the EEG due to emotional influences are demonstrable in both the waking and the hypnotic state. Kupper's (1945) demonstration of profound alterations in the EEG during hypnotic age-regression leaves little

doubt that it is possible to produce and to abolish at will pathologic electroencephalographic changes in a suitable subject by means of hypnotic suggestion.

Metabolism in Hypnosis

Since it is well established that the basal rate of metabolism is decreased by some 10 per cent during sleep, it is apparent that a comparison of the metabolic activity during hypnosis and the waking state should furnish a clue concerning the identity or nonidentity of the two conditions. Goldwyn (1930) has investigated this problem by comparing the basal metabolism of 18 normal subjects while awake and while under hypnosis. He was careful to induce a maximum state of mental and physical relaxation in his subjects under hypnosis before proceeding with the taking of the BMR; and, in general, he attempted to keep the experimental conditions identical in his two series of determinations. This author found that hypnosis in every case reduced the BMR, as determined in the waking state, the average reduction being 3.88 per cent. Goldwyn concluded that a decrease in basal metabolism is associated with the induction of hypnosis. This finding has been challenged by the work of Whitehorn, Lundholm, and Benedict (1932) who carried out a similar investigation and took the added precaution of training their subjects over a period of days before taking the waking BMR. Whitehorn and his associates found that several days of training in relaxation were necessary before true "basal" values could be obtained, and they comment that "if we had not avoided this source of error [i. e., failure to train their subjects for the BMR determinations] we might have been led to agree with Goldwyn." Using their more refined technic these authors could find no decrease in BMR under hypnosis, and they conclude that hypnosis probably helps to bring an untrained subject more readily into the "basal" condition than does simple training (which accounts for the difference in their findings and those of Goldwyn). The studies of Whitehorn et al. are the best ones available on the metabolic rate during hypnosis, and they indicate that no such decrease in the BMR as occurs during sleep takes place in the hypnotic state, providing precautions have been taken to ensure complete relaxation of the subject while the wak-

ing BMR is being determined.* Grassheim and Wittkower (1931) and Fulde (1937) similarly found that the BMR is not significantly affected by the induction of hypnosis.

That strong emotions are capable of increasing the metabolic rate appears to be generally recognized at present,** but the fact that data obtained by means of experiments utilizing hypnotic suggestion is available to substantiate this viewpoint is not so well known. The pioneering work in this field has been done by Grafe and his associates in Germany where so much of the basic research on the psychosomatic interrelationships which can be demonstrated by means of hypnosis has been carried out. Grafe and Traumann (1920) investigated the effect of hypnotic suggestions of emotional depression and heavy muscular work on metabolism in two subjects. In one case an increase from 6 to 12 per cent in the metabolic rate was noted following suggestions of depressing emotions, but no appreciable changes were observed in the other subject under similar conditions. In a series of experiments involving 10 subjects Grafe and Mayer (1923) studied the effects of suggesting various pleasant or unpleasant stimuli, including such calamities as the amputation of arms, deaths of relatives, and fights with cannibals. In six subjects there was a distinct rise of metabolic rate (ranging from 8 to 25 per cent), in one subject only a slight rise, and in another no change following the suggestion of unpleasant emotions. Two subjects who received pleasant suggestions showed only a slight increase in the metabolic rate. Grafe concluded that emotions may cause a distinct increase in metabolism, and that emotions producing sorrow are more effective in that respect than those producing joy. Fulde (1937) states that suggested excitement causes increased pulmonary ventilation, oxygen consumption, and CO_2 production.

A careful study by Whitehorn, Lundholm, and Gardner (1929-1930) confirms the foregoing findings in their essentials. These authors used the technic of post-hypnotic suggestion to induce various moods in a normal subject; the efficacy of these suggestions was tested by having the subject write out retrospective ac-

*That hypnosis is capable of bringing an untrained subject more readily into the "basal condition" than simple training, is explained by Whitehorn et al. as being due to the efficacy of hypnosis, as compared with ordinary reassurance, in overcoming the subject's anxiety.

**Best and Taylor (1945, p. 537) state that "*Strong emotions* may raise the basal metabolism from 5 to 10 per cent above the basal level."

counts of his feelings: Moods were suggested, instead of the more ambiguous instructions given by Grafe et al, in order to control the emotional variable more closely. Following a series of 20 experiments, which included BMR determinations during waking, hypnosis, and post-hypnotically suggested moods, these authors conclude: "The mood of anxiety or apprehension . . . can increase the metabolic rate. Moods of depression, of elation, and of irritability have not . . . produced any certain increase in metabolic rate."

The studies which have been summarized provide an experimental basis for the common clinical observation that worry and anxiety frequently lead to loss of weight—it being recognized, of course, that an increase in metabolism may not be the only factor involved in such a situation. Whether the rise in metabolic activity which accompanies an emotion such as anxiety is due to a general increase in muscular tension is not yet clear, but the studies of Jacobson and others lend considerable weight to such a supposition.*

The effectiveness of hypnotic suggestions of muscular work in increasing metabolic activity and pulmonary ventilation has been reported on by a number of Russian investigators. Nemtzova and Schattenstein (1936a) found that suggestions of work affected pulmonary ventilation and oxygen consumption as follows:

	Pulmonary ventilation L/min.	Oxygen consumption cc/min.
Hypnosis (resting)	4.35	177
Hypnotic suggestions of light work...	11.27	320
Hypnotic suggestions of heavy work...	14.5	409

The same authors also report (1936b) that when subjects, who were lifting weights rhythmically, received suggestions that the weights were lighter, pulmonary ventilation and metabolism diminished 20 to 30 per cent; suggestions that the weights were heavier caused an increase in metabolism of 30 to 50 per cent.** Levin and Ego-

*For a review of the literature concerning the muscular hypertension associated with various emotional states the reader should consult Dunbar's review (1935).

**These articles were seen only in abstract and the present author is therefore unable to evaluate the significance of these data, which are presented for whatever they may be worth.

linsky (1936) found that the most pronounced effect of hypnosis was the change in pulmonary ventilation when resting subjects were given suggestions of work (the ventilation equalling that of actual work). Oxygen consumption and ventilation were found to be unchanged when suggestions of rest were impressed on working subjects.

The inability of hypnotic suggestions to counteract certain normal physiological processes is well illustrated by the work of Grassheim and Wittkower (1931) who wished to see whether the specific dynamic action of protein could be reproduced by suggesting the intake of protein. A series of studies involving 20 subjects who received, under hypnosis, test meals containing protein showed that a typical specific dynamic action curve was obtained under these conditions. A test meal which was followed by suggestive removal yielded a typical specific dynamic action, even though the subjects felt hunger afterward. Non-protein test meals accompanied by suggestions of the intake of protein did not result in a specific dynamic action, and the authors conclude that the specific dynamic action of protein is not reproducible by means of hypnotic suggestion.

Reports of "hysterical fever" have appeared in the literature and have aroused interest in the extent to which the heat-regulating mechanisms of the body may be affected by "psychic" processes. Eichelberg (1921) reports a case of hysterical fever for which no organic basis could be found; he found it possible to remove the fever through hypnotic suggestion (a drop from 38.7 to 36.9°C). By means of hypnotic suggestion, changes of rectal temperature from 37.0 to 38.9°C could be obtained within 10 minutes, but no waking control experiments appear to have been carried out with this patient. A more elaborate study of the effect of hypnotic suggestions on temperature regulation is that of Gessler and Hansen (1927). BMR determinations were made on a naked subject lying in a room which was cooled or heated to specific temperatures and the increase or decrease in oxygen consumption noted. The data which were available to the present author (the article was seen in abstract) did not appear to justify the conclusion of the authors that the effects of the normal physiological heat-regulating mechanisms could be counteracted by hypnotic suggestion, especially since only one subject seems to have been used. The influence of hypnotic suggestion on the heat-regulating mech-

anism cannot be considered as having been established, and further experimentation is required to settle this question conclusively.

Respiration in Hypnosis

There is much disagreement in the literature concerning respiration in the hypnotic state. Many earlier investigators such as Walden (1900-1901) report a slowing in the respiratory rate, as does also Zynkin (1930), while others find variable figures. The early literature is reviewed by Jenness and Wible (1937) who have performed the best controlled experiments on this subject. These authors compared hypnosis, not only with the waking state, but also with normal sleep. In sleep they occasionally noted periodic respirations of the Cheyne-Stokes type, but never in the waking state or in hypnosis. Jenness and Wible concluded that hypnosis is identical with the normal waking state as far as respiration is concerned. In noting the apparent disagreement between their findings and those of other investigators, who report a slowing of respiration in hypnosis, they point out that this may be due to the fact that these other workers studied sleep instead of hypnosis, since they took no precautions to prevent their subjects from passing from hypnosis into sleep.

A considerable body of evidence exists which indicates that respiration can be powerfully influenced by hypnotic suggestions. In the section of this paper dealing with hypnotic anesthesia a summary will be found of the studies which have shown that the normal changes in respiration which accompany painful stimuli are capable of being inhibited by hypnotically-induced anesthesia. A number of Russian investigators have found that suggestions of work can increase pulmonary ventilation considerably. Nemtzova and Schattenstein (1936a) were able by suggestions of light work to increase a resting ventilation of 4.35 liters per minutes to 11.27 liters/min. Suggestions of heavy work resulted in a pulmonary ventilation of 14.5 liters/min.* Astruck (1923) also reports that respiratory activities may be influenced under deep hypnosis, but details of his work were not available to the present writer.

An interesting study of the effect of hypnotic suggestion upon hysterical hyperventilation and the resulting acid-base changes is

*Further details of these and related studies are found in the section of this paper dealing with "Metabolism in Hypnosis."

available in the work of Cohen and Cobb (1939) who report the case of a patient showing tetany and hyperventilation at the rate of 140 per minute. Suggestion to the patient that she "breathe slowly" resulted in the changes in respiration, pH and pCO_2 tabulated herewith.

Observation of Arterial Blood of Patient with Hysterical Hyperventilation Before and After Hypnotic Suggestion*

Hypnotic study number	Date and time	Respiration	pHs	pCO_2
1	2:30 p. m. before April 20	62	7.44	15.5
	4:30 p. m. After	20	7.34	27.3
2	2:10 p. m. Before April 23	132	7.52	22.6
	4:05	18	7.35	33.2
3	10:20 a. m. Before April 28	110	7.61	15.9
	11:50 a. m. After	20	7.46	27.7
	1:00 p. m. Before	18	7.38	36.5

*Cohen and Cobb (1939, p. 335), data as given: Respiration/min.; pCO_2 in mm. of Hg; and serum pH.

According to the authors, the pCO_2 of 15.9 mm. Hg. and the serum pH of 7.61 are values which represent "variations from the normal as extreme as have ever been observed in human beings."** When the values had dropped to normal levels within an hour, a carpal spasm resulting from tetany had disappeared. Cohen and Cobb further report that it was always possible to restore the patient's breathing to a normal rate and rhythm by suggestion, and that by post-hypnotic suggestion the breathing remained normal for an hour or more after hypnosis. It is important to note that under waking suggestion the patient "would sometimes respond a bit, sometimes not at all, but the response was not very marked." In this experiment we have good evidence that "objectively demonstrable changes" were produced in the patient's blood by hypnotic suggestion.

It is appropriate here to note the relationship which appears to exist among hyperventilation, alkalosis and hypnotizability. Cohen and Cobb report that "the ease with which the patient fell into

**A detailed biochemical study of this patient was made by Talbott, Cobb, Coombs, Cohen and Consolazio (1938)

hypnosis perhaps was related to the hyperventilation or the alkalosis or both." Sargant and Fraser (1938) state that overventilation results in the induction of a supersuggestible state in neurotics, and Seeligmuller (1934) has drawn attention to the same fact which has also been noted by Talbott, et al. (1938). Stockert (1930) has speculated that the alkalosis resulting from hyperventilation causes a vagotonic action which in turn promotes "hypnotic sleep." This author, unfortunately, fails to distinguish between hypnosis and ordinary sleep in his discussion. At present, as Cohen and Cobb point out, conclusive data showing that hyperventilation or alkalosis causes subjects to pass more easily into hypnosis is not available. These authors state that "The final demonstration of this must include a rather definite technique for hypnosis, a measure of the relative amount of ventilation, chemical determination of blood CO_2 and pH and a rather clearcut description of the 'depth of hypnosis.'" It will be recognized that this last demand for adequate criteria concerning depth of hypnosis is precisely one of the factors which has impeded research in this field. Moreover, because of the practice effect resulting from repeated hypnosis, which results in hypnotic induction becoming easier after each successive attempt, it would be difficult to demonstrate the hypothetical increase in hypnotizability resulting from alkalosis. That is, even if an increased case of hypnotizability could be shown to result from hyperventilation, it would be difficult to determine whether this was due to an alkalosis alone or whether it was merely due to the practice effect. It is conceivable, however, that a correlation might be established between the degree of alkalosis and the degree of suggestibility in the waking state. Such a study would provide a clue to the problem of the nature of the physiological basis for hypnosis.

Circulation in Hypnosis

Reviews of the literature on circulation in hypnosis by Kleitman (1939) and Jenness and Wible (1937) indicate that the findings of various earlier investigators concerning the activity of the circulatory system in hypnosis are conflicting in nature. Much of this early work can be subjected to criticism on various methodological grounds and is therefore not considered here. The best studies on this subject are those by Jenness and Wible (Jenness and Wible, 1937; Wible and Jenness, 1936) who used the electro-

cardiograph to measure heart action in sleep and hypnosis.* Their data show cardiac activity to be identical in hypnosis and the waking state, sleep being found to lower it considerably. Whitehorn et al. (1932) noted a slight lowering in the heart rate in the trance as compared with the non-trance state, and this observation was made by several other investigators. It is probable that this lowering is due to the complete relaxation obtained with hypnosis (which has also been found to lower BMR values very slightly). The view of Jenness and Wible that hypnosis *per se* does not bring about any significant changes in cardiac activity is in harmony with all the other evidence pointing toward the physiological identity of hypnosis with the waking state and can therefore be accepted as describing the true state of affairs.

Nygard (1939) has made a study of the cerebral circulation prevailing during sleep and hypnosis. He could find no changes in the cerebral circulation during hypnosis, and the pulse could not be distinguished from a corresponding waking period in amplitude, form of pulse wave, or volume. In sleep, on the other hand, the blood volume increased and the pulse became more pronounced. During this study, depth of hypnosis was tested with post-hypnotic amnesia and hypnotically-induced hallucinations.

The ability of emotional changes produced under hypnosis to influence the heart rate is well established by such studies as those of Deutsch and Kauf (1923).** Whitehorn (1939) found that in one subject in whom anxiety was hypnotically induced on signal the heart rate showed an 80 per cent acceleration within the minute following the signal. Whether cardiac activity can be accelerated or slowed by direct hypnotic suggestion ("Your heart is beating fast, etc.") is still an open question. Jenness and Wible (1937) definitely state that the heart rate could not be accelerated by direct suggestion to that effect. Others such as Wilson (1927) and Astruck (1923) have claimed success in obtaining acceleration of the heart rate, but it is not clear whether they accomplished this by direct suggestions alone or whether suggestions of an emotional nature were involved.

*Schneck (1947) comments on the clinical advantages of electrocardiography under hypnosis.

**Reviewed in detail in the section of this paper dealing with "Hypnosis in Psychosomatic Research."

812 Denver Street, Wichita Falls, Texas

POPE GRANTS USE OF PAIN RELIEVER*

Anesthesia in Surgery and as Aid to Dying Favored

PAUL HOFMANN

AVOIDANCE of physical pain is permissible if an "advantage of higher worth" is gained, Pope Pius XII said today.

The Pope's doctrinal pronouncement on anesthesia and pain relievers was contained in an address to an international group of 500 physicians gathered in the Vatican.

Modern methods of pain prevention, including medical hypnotism, are reconcilable with the Christian duty to mortify the flesh, the Pope declared. He made it plain, however, that when one's faith was at stake, suffering and even martyrdom must be faced.

He praised new techniques, especially in heart surgery, that have been made possible by anesthesia, "a science as well as an art."

He also warned against addiction to narcotics and abuse of recently developed tranquilizing drugs. Severe legislation is needed to curb improper sale and administration of narcotics, he said.

The Pope condemned by implication the sale of tranquilizers without medical prescription but did not elaborate on the use of these drugs. He did say "the abuse of drugs leads to complete neglect of the most fundamental demands of personal and family life."

Previous rulings approving methods for painless childbirth and condemning euthanasia, or mercy killing, were reconfirmed by the Pontiff. He said anesthetics might be administered to dying patients in great pain after moral and religious obligations had been fulfilled. In other words, a patient may be rendered unconscious after he has made his will and received the last sacraments.

Pius, who was himself gravely ill two years ago, told the physicians: "Suffering will never be completely banished from among men, but its harmful effects can be restricted within narrower limits."

Citing Matthew, xxvii, 34, the Pope stated that immediately before the Crucifixion Jesus was offered wine mixed with gall, "doubtless to mitigate His sufferings." He would not drink it because He wished to suffer fully conscious, the Pope said.

"To accept and even to seek physical pain in order the better to share in the Passion of Christ" is, according to the Pontiff, fundamentally Christian. But he stressed that this was only one of several ways toward "Christian heroism."

*Republished by permission of the Buffalo Courier-Express

A Christian who carries out "all the duties of his state or profession, the laws of God and man, prays with recollections, does his work wholeheartedly, resists his evil passions, shows his neighbor the charity and service that are his due, endures bravely without murmuring whatever God sends him, that man is always living beneath the sign of the cross of Christ whether physical suffering is present or not," the Pope said.

However, he warned Christians that they were bound in conscience to accept physical pain whenever faced "with the inescapable alternative of enduring suffering or acting contrary to a moral obligation."

Martyrdom was not a matter of ancient church history only, the Pope declared. With a clear reference to the persecuted faithful in the Communist countries, he praised the "magnificent examples of Christians who for weeks, months and even years endure suffering and physical violence in order to remain faithful to God and their conscience."

The Pope answered three questions on the religious and moral implications of pain prevention that a group of Italian anesthetists had submitted to him. The questions were:

First, is there a universal moral obligation to refuse analgesia (elimination of sensibility to pain) and to accept physical pain in the spirit of faith?

Second, is it in keeping with the spirit of the Gospel to bring about by means of drugs loss of consciousness and use of man's higher faculties?

Third, is it lawful for the dying to make use of drugs if medically indicated? May drugs be used even if relief of pain shortens life?

On the first point the Pope declared that anesthesia was "in accordance with the ordinance of the Creator to bring suffering under man's control."

As for loss of consciousness, the Pontiff noted that it occurred also in natural sleep and was "permitted."

To the question whether drugs may be used at the deathbed to alleviate pain even if they hasten death, the Pope replied, "Yes, provided that no other means exist and if in the given circumstances (administration of such drugs) not prevent carrying out other moral and religious duties."

Euthanasia, or mercy death, is "unlawful," the Pontiff said, because "man is not master and owner but has only the use of his body and life."

In cases of inoperable cancer or other incurable diseases, drugs to relieve unbearable pain may be administered even if they shorten life, "if there exists no direct casual link either through the will of the interested parties or by the nature of things," the Pope said.

The Pope's allocution, which exceeded 7,000 words, covered also the following problems:

Narcosis, which produces unconsciousness and arrests mental control mechanisms is "particularly dangerous when it evokes revelation of secrets of private and social life." The Pope sternly reminded surgeons and their attendants that they were duty bound not to divulge what patients babbled in operating theatres.

Hypnosis is acceptable in medicine as "psychic pain prevention." It should be studied only by serious scholars and not by laymen or ecclesiastics.

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